THE AMERICAN GAS LIGHT JOURNAL AND CHEMICAL REPERTORY

Devoted to the Interests of Illumination, Heating, Ventilation and Sanitary Improvement, Domestic Economy, and General Science.

PUBLISHING OFFICE, No. 22 PINE STREET.

VOLUME XI.—No. 1. WHOLE No. 229. | NEW YORK, WEDNESDAY, JULY 2, 1869. | $3 PER ANNUM IN ADVANCE.

Something New in Portable Gas Generators.

The two great requirements of the age are cheap and rapid locomotion, and cheap and good light. There have been many attempts made to produce the latter by portable apparatuses, so that each house occupant can manufacture their own gas, independent of gas companies. This is especially necessary for country houses at a distance from gas works, of which there are hundreds, which are yearly increasing near all large cities, New York particularly. Apparatus for making gas by the distillation of rosin and petroleum have long been in use, but the process is expensive.

The next attempts were in making a gas by passing air through the light volatile hydro-carbon liquids obtained from petroleum, as gasoline; but this has been found inadequate for the purpose, for many reasons, viz., air, or atmosphere, is composed of 80 per cent. of nitrogen and 20 per cent of oxygen gas; the former has no affinity for carbon or hydrogen, which are the constituent parts of the volatile liquids referred to; therefore, in passing air through gasoline, the atmosphere, if warm, will carry off the vapor of the hydro carbon liquid only in a state of mechanical suspension, and the quantity of the vapor so carried off depends on the amount of caloric in the air so passed through. This vapor returns to its liquid state at 40 deg. Fahrenheit, so that if any part of the pipes of the building are exposed to the out door temperature, in winter the vapor loaded air passing through them will deposit the vapor as a liquid, and the air will pass on with only the 20 per cent of oxygen mixed with the vapor, but this will not give enough light.

Also, the air in passing through the gasoline carries off the caloric and, and unless kept warmed will soon reduce its temperature to a point where it stops evaporating, when the lights go out.

In warming the vapor before it enters the main pipes of the building, the liability still remains of its condensing in the pipes: and the only way which this can be prevented is to warm it in a state of vapor, just before it enters the flame. The invention we are called upon to notice is represented in the accompanying engraving, and seems to have surmounted these heretofore apparently insurmountable obstacles, in the successful use of the light hydro carbon fluids for generating gas. The invention is patented on the principle of the application, and although the engraving represent a pendant chandelier, the principle is applicable to any kind of gas fixture, without interfering with its artistic design of construction. Its operation is exceedingly simple; A is a pipe through which pure air is forced by means of the reversed motion of a common wet gas meter impelled by a weight and the necessary gearing, which gives a steady pressure. This pipe is so formed that the air in its passage is brought directly over the burner at the bend of the pipe and heated thereby. It then passes on and issues in small streams through the perforations at B, and rises through a stratum, C, of fluid hydro-carbon contained in an air-tight vessel, D; or the same may be filled with small pieces af sponge which absorb it and permit the heated air to thoroughly permeate it, thus volatilizing the fluid and becoming charged with the vapor. It passes into the

open mouth of another tube, E, rising above the level of the fluid in D, and so on to the burner.

When argand burners are used disks of mica, F, are attached to the tube, A, at the bend directly over the burner, and brought down to about one-eighth of an inch from the top of the chimneys, or metallic disks, with a hole in their centre, and resting on the chimneys, may be used with the same effect. The inventor claims that this arrangement stops the rapid draft of air in the chimney, and enables the incandescent carbon, which is the light giving agent in all flames, to remain longer in a state of incandescence, thereby rendering the flame larger and increasing its luminosity, without incurring increased consumption of gas. With the ordinary burner the disks are not used. Instead, the pipes are formed into ornamental knots at the point where they turn over the burner.

The pipes are furnished with wire gauze between the fluid and the burner, to prevent any chance of the flame running back. In the cold air process it requires from 50 to 80 per cent of air to carry over the same amount of vapor that 20 per cent of hot air will do. This enables a smaller burner to be used and a better light to be obtained, as the less quantity of air mixed with the vapor the better the light, for the reason that the nitrogen of the air acts as a deteriorator, like carbonic acid gas, by cooling the incandescent carbon by its presence, and preventing the flame from giving the full brilliancy of which it is capable.

The inventor assures us that gas can be made by this process at a cost of 75 cents per 1000 cubic feet, as three gallons of the liquid vaporized with the air will do this, at a cost of 25 cents per gallon, and of a light-giving quality far superior to the best coal gas. And as the liquid is confined completely from contact with the surrounding atmosphere in the process, it is perfectly safe. Country houses can, by having their gas fixtures constructed on this principle, make their own gas and do away with the use of gas machines, with all their objections. This principle is admirably adapted for illuminating lighthouses, as the cold weather and exposure do not interfere with it.

The same method seems equally applicable to the enriching of ordinary coal gas, and probably a considerable saving might be made by its use in rural towns where gas works are small, the price high, and the quality of the gas furnished none of the best.

☞Rights to manufacture and use this principle may be had, by addressing C. F. Dunderdale, 90 Wall street New York.

Preparation of Olefiant Gas, and the so-called Dutch Liquid.—Many years ago Mitscherlich discovered a process for the preparation of olefiant gas, which yields it almost continuously, and gives at the same time, a very pure product. This process is based upon the fact that a sulphuric acid of such strength as to have its boiling point at 165 deg. C. (a mixture of 10 parts by volume of strong sulphuric acid and 3 of water), decomposes the vapor of strong alcohol into water and olefiant gas. The full description of this process and also the simultaneous preparation of elayl-chloride, or Dutch liquid, cannot be well understood, says the *Chemical News*, without a wood cut.

The Massachusetts Imbroglio.

This controversy, to which we alluded in our last, arose out of the presentation to the House of Representatives of Massachusetts during its session just closing, of an Act proposed as a substitute for one which has been in force since July 1st, 1869, regulating illuminating gas. All the documents being in our hands, we propose to lay the whole case substantially before our readers, regarding it as an instructive chapter in the history of Gas Legislation in this country. We present first both the Acts in full:

ACT OF 1861.

SECT. 1. The governor shall, with the advice and consent of the council, appoint an Inspector of Gas Meters and of Illuminating Gas, whose office shall be in the city of Boston, and whose duty it shall be when required, as is hereinafter provided, to inspect, examine, prove, and assertain the accuracy of any and all gas meters to be used for measuring the quantity of illuminating gas to be furnished to or for the use of any person or persons, and when found to be correct, to seal, stamp, or mark all such meters, and each of them, with some suitable device, and with his name, the date of his inspection, and the number of burners it is calculated to supply. Such device shall be recorded in the office of the secretary of the Commonwealth.

SECT. 2. He shall hold his office for the term of three years from the time of his appointment, and until the appointment of his successor, but may be removed by the governor and council at their pleasure, and he shall receive an annual salary of three thousand dollars, which shall include his office-rent and expenses, to be paid out of the treasury on the warrant of his excellency the governor. Such inspector shall not in any way or manner, directly or indirectly, be interested pecuniarily in the manufacture or sale of illuminating gas or meters, or of any article or commodity used by gas light companies, or for any purpose connected with the consumption of gas, or with any gas company; and shall not give certificates or written opinions to any maker or vender of any meter, or of any such article or commodity; and he shall be duly sworn to the faithful performance of his duties, and shall give bonds in the sum of five thousand dollars for the faithful discharge of the same: *provided, however*, that no warrant shall be drawn for the whole or any part of the salary of said commissionor for any larger amount than may have been actually paid into the treasury of the Commonwealth.

SEC. 3. Said inspector shall, within three months after his appointment, furnish to the treasurer and receiver-general a list of all the gas light companies in operation in the Commonwealth; and his salary for the year then commenced, and annually thereafter, shall be assessed and paid into the treasury of the Commonwealth by the several gas light companies in this Commonwealth, in amounts proportionate to their appraised valuation, as declared in the returns required in the General Statutes of this Commonwealth, chapter sixty eight, section twenty; and in case such gas light companies, or any or either of them, shall refuse or neglect to pay into the treasury the amount or portion of said salary which shall be by said treasurer required of them respectively, for the space of thirty days after written notice given by said treasurer to them respectively, to make such payment, then the said treasurer shall institnte an action in the name of, and for the use of, the Commonwealth, against any such delinquent gas light company for their said portion or amount of such salary, with interest thereon at the rate of ten per centum per annum, from the time when said notice to make such payment was given, and the costs of the action.

SEC. 4. Whenever the inspector shall find himself unable to attend to his duties in any city or town of any county, he shall appoint, temporarily, and for such times as he may deem expedient, one or more deputy-inspectors of meters for such county, who shall act under his direction; they shall be duly sworn to the faithful performance of their duties, and shall not in any manner be connected with or employed by any gas company, and shall be subject to the same disabilities as are set forth in section second, and shall be paid by fees for examining, comparing, and testing gas meters, with or without stamping them which fees shall be twenty-five cents for each meter delivering a cubic foot of gas in four or more revolutions, vibrations, or complete repetitions of its action, and thirty cents for each meter delivering a cubic foot of gas in any less number of revolutions as heretofore described, and for each meter thus delivering more than one cubic foot of gas as before named the further sum of twenty cents for every additional cubic foot of gas delivered: *provided, however*, that in all cases of inspection by the deputy-inspector the gas company or consumer may appeal to the state inspector from the deputy-inspector's decision.

SEC. 5. The standard or unit of measure for the sale of illuminating gas by meter shall be the cubic foot, containing sixty-two and three hundred twenty-one one-thousandth pounds avoirdupois weight of distilled or rain water, weighed in air of the temperature of sixty-two degrees Fahrenheit scale, the barometer being at thirty inches.

SEC. 6. No meter shall be set after the first day of October, eighteen hundred and sixty one, unless it be sealed and stamped in the manner required by this act.

SEC. 7. There shall be provided at the expense of the gas companies of the Commonwealth, at the office of the inspector, a standard measure of the cubic foot, and such other apparatus as in his judgement shall be necessary for the faithful performance of the duties of his office.

SEC. 8. Every gas light company with a capital paid in of one hundred thousand dollars, or more, and every maker and vender of meters, shall set up at some convenient place upon their premises a gas-holder, to be tested, and if correct stamped and sealed, containing five or more cubic feet, by means of which meters shall be tested at the average pressure at which gas is supplied in the city or town where they are to be used; attention being paid to the temperature of the room where the trial is made, of the apparatus, and of the gas. There shall be provided by every gas light company, a test meter of a construction approved by the inspector and stamped by him, to be used in cities and towns where no test gas holders are provided, or whenever proving by a gas-holder is impracticable or inconvenient. In the examination of a meter the inspector shall see that it is an approved principle, and shall give his particular attention to the measure of the dial-plate; he shall prove the meter when set level, and for each burner which the manufacturer has stamped it to register, it shall be capable of passing gas accurately at the rate of six cubic feet per hour; and no dry meter shall be stamped correct which varies more than two per cent. from the standard measure of the cubic foot, and no wet meter shall be stamped correct, which is capable of registering more than two per cent. against the consumer, and five per cent. against the company. He shall keep at his office a correct record of all meters inspected by him, with their proof at the time of inspection, which record shall be kept open at all times for examination by the officers of any gas light company in this Commonwealth.

SEC. 9. Meters in use shall be tested on the request of the consumer, or the gas light company, in the presence os the consumer if desired, with sealed apparatus, as provided for in section eight, by the inspector or deputy-inspector. If the meter is found to be correct, the party requesting the inspection shall pay the fees named in section four, and the expense of removing the same for the purpose of being tested, and the re-inspection shall be stamped on the meters. If proved incorrect, the gas light company shall pay such expenses, and shall furnish a new meter without any charge to the consumer.

SEC. 10. Illuminating gas shall not be merchantable in this Commonwealth which has a minimum value of less than twelve candles; that is, a burner consuming five cubic feet per hour shall give a light as measured by the photometric apparatus in ordinary use, of not less than twelve standard sperm candles, each consuming one hundred and twenty grains per hour. Every gas is to be tested with the burner and under the pressure best adapted to it, and the result shall be calculated at a temperature of sixty degrees Fahrenheit. Whenever requested by the mayor and alderman of any city, or the selectmen of any town, the inspector shall report to them whether the gas supplied in the respective city or town is of the legal standard, and also whether it is sufficiently well purified from sulphuretted hydrogen, ammonia, and carbonic acid.

SEC. 11. Any officer or servant of a gas light company, duly authorized in writing by the president, treasurer, agent, or secretary of said company, may at any reasonable time, enter any premises lighted with gas supplied by such company, for the purpose of examining, or removing the meters, pipes, fittings, and works for supplying or regulating the supply of gas, and of ascertaining the quantity of gas consumed or supplied, and if any person shall at any time, directly or indirectly, prevent or hinder any such officer or servant from so entering any such premises, or from making such examination, or removal, such officer or servant may make complaint under oath to any justice of the peace of the county wherein snch premises are situated, stating the facts in the case so far as he has knowledge there of, and the said justice may thereupon issue a warrant directed to the sheriff or either of his deputies, or to any constable of the city or town where such company is located, commanding him to take sufficient aid and repair to said premises, accompanied, by such officer or servant who shall examine such meters, pipes, fittings, and works for supplying or regulating the supply of gas, and of ascertaining the quantity of gas consumed or supplied therein, and if required remove any meters, pipes, fittings, and works belonging to said company.

SEC. 12. If any person or persons supplied with gas neglects or refuses to pay the amount due for the same, or for the rent of the meter or other articles hired by him or them of the company, such company may stop the gas from entering the premises of such person or persons. In such cases the officers, servants, or workman of the gas light company, may, after twentw-four hours' notice, enter the premises of such parties, between the hours of eight in the forenoon and four in the afternoon, separate and take away such meter, or other property of the company, and may disconnect any meter, pipes, fittings, or other works, whether the property of the company or not, from the mains or pipe of the company.

SEC. 13. Every person who wilfully or fraudulently, injures, or suffers to be injured, any meter, pipes, or fittings belonging to any gas light company, or prevents any meter from duly registering the quantity of gas supplied through the same, or in any way hinders or interferes with its proper action or just registration, or fraudulently burns the gas of said company, or wastes the same, shall for every such offense, forfeit and pay the company not more than one hundred dollars, to be recovered in an action of tort to be brought by the company against such offender, and in addition thereto, shall pay the company the amount of damage by them sustained by reason of such injury, prevention, waste, consumption, or hinderance.

SEC 14. Every person who attaches anv pipe to any main or pipe belonging to any such gas light company or otherwise burns, or uses, or causes to be used, any gas supplied by said company, without their written consent, unless the same passes through a meter set by the company, shall forfeit and pay to said company the same fine and in the same manner as declared in section thirteen.

SEC. 15. This act shall apply to all companies who manufacture gas for sale, and shall take effect July first, eighteen hnndred and sixty one.

Approved April 10, 1861.

ACT PROPOSED IN 1869, BY MR. NATHANIEL C. NASH.

SEC. 1. The mayor and aldermen of every city, and the selectmen of every town in the Commonwealth where there is a gas company having five hundred or more takers or consumers of gas, shall appoint one or more suitable persons as inspectors of gas, whose duty it shall be to test the quality of the gas and the accuracy of the meters used for its measurement. In cities and towns having a less number of gas-takers than five hundred, the mayor and aldermen, and selectmen, may appoint such inspectors if they so determine.

The city council of cities and selectmen of towns may establish such rules, orders and regulations for prescribing the duties and controlling the action of said inspector or inspectors as they shall deem expedient: *provided*, that such rules, orders and regulations are in accordance with law.

SEC. 2. Every such inspector shall hold his office for the term of three years from the time of his appointment, and until the appointment of his succeesor; but any such inspector may be at any time removed for cause by the supreme court.

Such inspectors shall receive such annual salaries, to be paid by the city or town appointing them, as the city council of such city or the selectmen of such town may determine. No such inspector shall be in any way in the employ of any gas company, or a stockholder therein, or connected therewith, or in any manner, directly or indirectly, interested pecuniarily in the manufacture or sale of illuminating gas or gas-meters, or of any article or commodity used by gas-light companies, or of any purpose connected with the manufacture or consumption of illuminating gas; and he shall be sworn to the faithful performance of his duties.

SEC. 3. In every city and town where an inspector or inspectors are appointed, it shall be the duty of such city or town to provide, at a distance as near as may be of two thousand feet from any gas works, and furnish for the use of such inspector or inspectors, a suitable room or laboratory having one or more gasometers, holding at least five feet of gas, made with proper balances, indices and adjustments, a special meter or regulator for accurately measuring the capacity of any kind of gas meter, and supplied with all other apparatus necessary or useful in testing meters, and illuminating and other qualities of the gas sold by such company or companies, but no such room or laboratory shall be located in any building, a part of which is occupied by any gas-light company or manufacturer of gas meters.

SEC 4. It shall be the duty of the inspector or inspectors once in twenty-four hours to test and determine, photometrically and chemically, the quality and illuminating power of the gas supplied to consumers, the pressure in the service-pipes at a point not less than one thousand yards distant from the gas works, and they shall also state the average consumption of gas by street burners; and to report the results monthly to the city council of said cities and selectmen of said towns. These reports shall state the average pressure of the gas in the pipes and its average quality and illuminating power, as ascertained by daily observations; and they shall also state any facts or suggestions as to the more economical combustion of gas by improved burners, diminished pressure, the size of the

flame, or any matter of interest to consumers of gas; and such gas shall, with respect to its purity, be so far free from ammonia and sulphuretted hydrogen that it shall not discolor either turmeric paper or paper imbued with acetate or carbonate of lead, when the tests are exposed to a current of gas issuing for one minute under a pressure of five-tenths of an inch of water, and shall not contain more than twenty grains of sulphur in any form in one hundred cubic feet of gas.

SEC. 5. Illuminating gas shall not be merchantable in any city or town where an inspector is appointed which has a minimum value of less than sixteen candles; that is, a brass argand burner having fifteen holes arranged in a circle of seventy-four one-hundredths of an inch in diameter, measured from the inside of the holes, each hole being five one-hundredths of an inch in diameter, and the body of the burner having an external diameter at the top of the same of one inch and ten one-hundredths of an inch, and an external diameter at the base of the burner of one inch and twenty-four one hundredts of an inch, and an internal diameter at the top of the burner of five-tenths of an inch, and an internal diameter at base of burner of sixty-eight one-hundreths of an inch, and a total height or length of burner of two inches and nine-tenths of an inch, and a height of same from centre of crutch of one inch and eighty-two one-hundredths of an inch, and a height of body or cylindrical portion of burner of one inch and five-tenths of an inch; the disc at top of burner, through which the holes are bored, to be of iron and have a level surface; using a gallery or chimney-holder having an external diameter of two inches and thirty-hundredths of an inch, and an internal diameter of the same of two inches, with four bearing bars having each a depth of thirteen-hundredths of an inch, and an external diameter of the ring of the gallery or chimney-holder where it slides upon the burner, of one inch and twenty-four-hundredths of an inch, using a cylindrical glass chimney seven inches high, with an internal diameter of two inches, and a thickness of six one-hundredths of an inch, and consuming five cubic feet of gas per hour, with a barometric pressure of thirty inches, must afford as much light as sixteen spermaceti candles, consuming one hundred and twenty grains per hour, at the temperature of sixty degrees Fahrenheit.

SEC. 6. Gas companies, or consumers of illuminating gas may use either wet or dry meters of any description; but in every city and town where an inspector is appointed, every meter shall, before being set, be tested by the inspector and stamped by him with his name, the city or town seal, the date of stamping, and the number of burners it can supply; and whenever any meter is removed or repaired and reset, it shall be tested and stamped anew with the date and name of the inspector, and no new or reset meter shall be a legal standard of measurement that is not so stamped and sealed with a seal to be adopted by such cities and towns where an inspector is appointed.

SEC. 7. In testing meters the inspector shall ascertain whether the meter is of proper construction, and requires only the pressure of a column of water indicated by the water-guage, commonly used for such tests of one-fourth of an inch high to work it, and whether it works regularly and correctly, and registers exactly the amount of gas passing through it, first at the rate the meter is marked to supply; second, at one-third its rate; third, at twice its rate.

The standard foot shall be one cubic foot, containing sixty two and three hundred and twenty-one thousandths pounds, avoirdupois weight, of distilled water at the temperature of sixty-two degrees Fahrenheit and with a barometrical pressure of thirty inches; and meters registering within two per centum either way of the exact number of such feet passing through them at the first named rate, and within three per centum at the second and third rates, and no others, shall be deemed accurate and be stamped by the inspector.

The city or town inspectors shall keep at their offices a correct record of all meters inspected by them with their proof at the time of inspection, which record shall be open at all times for examination by any member of city and town governments and the inhabitants thereof where such inspectors are appointed.

SEC. 8. The fees of the inspector, for examining, comparing, and testing meters for the gas companies or manufacturers of meters, with or without stamping them, shall be twenty-five cents for each meter delivering a cubic foot of gas in four or more revolutions, vibrations or complete repetitions of its action, and thirty cents for each meter delivering a cubic foot of gas in any less number of revolutions, vibrations or complete repetitions of its action; and, for each meter delivering more than one cubic foot of gas in one revolution, vibration or complete repetition of its action, the further sum of twenty-five cents for every additional cubic foot of gas delivered at any revolution, vibration or complete action; and the cost of said removal shall be paid by the gas companies or manufacturers, when the meters are first tested and stamped, and at all other times when tested at their request.

SEC. 9. Any gas meter shall be inspected or tested at any time by the inspector, upon the request of either the gas company or consumer, and in the presence of the consumer, if desired: and the meter, when thus to be removed for inspection, if a wet meter, shall first be examined by the inspector where the same is in use, to ascertain whether it is fixed on a horizontal base; and after thus examining such meter in like manner with all other meters, it shall be taken directly to the office of the inspector; and the inspector may, for the purpose of inspecting the meters, at any reasonable time enter into any building or premises where gas is used and direct the removal of the meter, suitable notice being given the gas company to take the register of the same, bnt in no manner to change the condition of the meter from what it was at the time the request was made of the inspector to test its accuracy of measurement.

If the meter is found to be correct, the party requesting the inspection shall pay the fees named in section eight, and also the expense of removing the meter for the purpose of being tested; and the date of the re-inspection shall be stamped on the meter with the name of the inspector. If proved incorrect, the gas-light company shall pay such expense, and shall furnish a new meter without any charge to the consumer. In cities and towns where the inspector or inspectors are appointed, all meters shall be re-inspected at least as often as once in three years; and all meters in use on the first day of July, in the year eighteen hundred and sixty-nine, that have not been inspected, shall be inspected within six months from that date; and if after the first of January, eighteen hundred and seventy, there shall be found in use in cities and towns where inspectors of gas and gas meters are appointed, any meters belonging to any gas company or private individuals that have not been inspected, such gas companies or private persons shall be subject to a penalty of not less than ten dollars nor more than twenty dollars, to be recovered by said cities and towns as hereinafter provided in section fourteen.

SEC. 10. Any officer or servant of a gas-light company, duly authorized in writing by the president, treasurer, agent or secretary of said company, may enter any premises lighted with gas supplied by such company, for the purpose of examining or removing the meters, pipes, fittings and works for supplying or regulating the supply of gas, and of ascertaining the quantity of gas consumed or supplied; and if any person other than an inspector appointed in pursuance of the provisions of this act shall at any time, directly or indirectly, prevent or hinder any such officer or servant from so entering any such premises, or from making such examination or removal, such officer or servant may make complaint under oath to any justice of the peace of the county wherein such premises are situated, stating the facts in the case, so far as he has knowledge thereof, and the said justice shall thereupon issue a warrant directed to the sheriff or either of his deputies, or to any constable of the city or town where such company is located, commanding him to take sufficient aid, and repair to said premises, accompanied by such officer or servant, who shall examine such meters, pipes, fittings and works for supplying or regulating the supply of gas and of ascertaining the quantity of gas consumed or supplied therein, and, if required, remove any meters, pipes, fittings and work belonging to said company.

SEC. 11. If any person or persons supplied with gas neglect or refuse to pay the amount due for the same, such company may stop the gas from entering the premises of such person or persons.

In no case shall the officers, servants or workmen of the company remove a meter from premises supplied by the company, unless by consent of the consumer, without first giving forty-eight hours' notice in writing by leaving the same at the premises of the consumer: and said removal shall take place only between the hours of eight o'clock in the forenoon and two o'clock in the afternoon.

SEC. 12. Every person who shall wilfully or fraudulently injure, or suffer to be injured, any meter, pipes, or fittings belonging to any gas-light company within any city or town, or prevent any meter from duly registering the quantity of gas supplied through the same, or in any way hinder or interfere with its proper action or just registration, or shall fraudulently burn the gas of said company, or waste the same, shall for every such offence forfeit and pay to the company not less than twenty-five dollars nor more than one hundred dollars, to be recovered in any action of tort to be brought by the company against such offender, and in addition thereto shall pay the company the amount of damage by them sustained by reason of such injury, prevention, waste, consumption or hindrance.

SEC. 13. Every person who shall attach any pipe to any main or pipe belonging to any such gas-light company, or shall otherwise burn, or use, or cause to be used, any gas supplied by said company without their written consent, or without having the same passed through a meter set by the company, and whoever shall light a street lamp supplied with gas by said company, without their written consent, other than those appointed by city and town authorities, shall forfeit and pay to said company the same fine, and in the same manner as declared in section twelve.

SEC. 14. If at any time the gas supplied by a gas company shall be of less illuminating power or of less purity than according to the standard established by the fifth section of this act, it shall be the duty of the city or town inspector to report the same to the city council in cities and the selectmen in towns, and thereupon the said company shall be liable to a penalty of one hundred dollars, to be recovered on complaint of said city or town before the municipal or police court thereof, or where such courts do not exist, before a trial justice, said penalty, when recovered to be paid into the treasury of said city or town: *provided, however*, that if it appears that such deviation from the above-named standards could not have been prevented by ordinary care and prudence, but was occasioned by some unavoidable cause, then the penalty shall not be inforced; and the burden of proof shall be on said gas company to show that it could not have been so prevented.

SEC. 15. Chapter one hundred and sixty-eight of the laws of eighteen hundred and sixty-one is hereby repealed.

SEC. 16. This act shall go into effect July first, eighteen hundred and sixty-nine.

The subject was referred, as it would appear, to a joint committee of the Senate and House, of which Mr. NASH, the proposer of the new bill was a member. The majority of this committee rendered the following Report, which, as it is interesting, pertinent, and not too long, we shall reproduce also in full:

HOUSE OF REPRESENTATIVES May 5, 1869.

The Committee on Mercantile Affairs, to whom was referred the Bill "for the regulation of gas companies and the better protection of the consumers of gas," introduced on leave by Mr. Nash of Boston, respectfully submit the following

REPORT.

The circumstances under which the bill came before the Committee for their consideration were somewhat anomalous. It was introduced in the House, on leave, by a member of the Committee, who was the only person that appeared before them to explain its provisions and to advocate it.

The Committee had three public hearings, which were conspiciously advertised in the "*Boston Daily Advertiser*," *and* "*Boston Journal*."

No petitions for a change in the present law were presented, and no evidence furnished that the consumers of gas desired a change; no one appeared to testify in favor of the bill and it was advocated by outside of the Committee. On the other hand most of the Companies of the State appeared before the Committee by their agents, who remonstrated against the bill.

The proposed bill repeals the existing law, chapter 168 of the Acts of 1861, relative to the inspection of gas and gasmeters. It substitutes a new set of office rs for the purpose of inspection, who are to be distributed over the State, one or more for every town having five hundred or more takers or consumers of gas, and to be appointed by the city and town officers, in place of the single State inspector, with an office in Boston, and appointed by the governor and council, as now provide by law.

The bill further provides that all meters in use tha have not been inspected *shall* be inspected before a fixed date, and imposes a penalty upon any gas company or private person, to whom a meter belongs, that shall be in use in any city or town where inspectors are appointed, without having been inspected, and requires the re-inspection of all meters at once at least every three years, and provides that no new or reset meter shall be a legal standard of measurement that is not tested and stamped by an inspector. Under the present law, all meters set after October first, 1861, are required to be inspected and stamped by the State inspector on the request of either the consumer of the gas light company, and in presence of the consumer if desired.

The agent of the Boston Gas-Light Company testified before the Committee that of the 24,000 meters in the city of Boston, which are about half of the whole number in the State, nearly all have been inspected by the State inspector under the present law.

The bill further provides that the quality and illuminating power of the gas, and the pressure in the service pipes, shall be tested and determined once every twenty-four hours, and reported monthly to the city council of the cities and the selectmen of the towns, and that the inspectors shall also state the average consumption of gas by street burners, also report facts or suggestions with respect to improved burners or any other matter of interest to consumers of gas. The present law requires the State inspector to report to the mayor and alderman of any city or the selectmen of any town with regard to the purity and illuminating power of the gas only when requested by them.

The bill provides that illuminating gas shall not be merchantable which has a minimum value of less than *sixteen candles*, and requires that a certain kind of burner, minutely described, shall be used as a standard in

testing the illuminating power of all kinds of gas; and makes the company also liable to a penalty for supplying gas of less illuminating power than the established standard,—while the present laws fixes the minimum limit at *twelve* candles, and every gas is to be tested with the burner and under the pressure best adapted to it, and no penalty is imposed beyond making gas unmerchantable which is below the fixed standard,—that is to say, no bill for gas furnished below that standard can be collected at law, and if such a bill is paid the mony can berecovered back from the company.

The bill requiresthat the gas companies of every city or town where an inspector is appointed, shall provide and furnish for the inspector a room or labortory with gasmeters and apparatus for testing meters and gas, which laboratory is to be at a certain distance from the gas works, and is not to be located in any building occupied by any gas light company or manufacturer of gasmeters.

In most other repects than those above noticed the proposed blil is similar in its provisions to the existing law.

There may be some details in the proposed bill which if suggested as amendmends of the existing law, might be desirable in the way of supplying omissions and as tending to perfect it.

But the main features of the bill, in which it differs from the old law, and for which it is chiefly recommended by its advocate, we are unable to accept and recommend upon such information as we have yet received. These features are those by which one or more inspectors for every town or city are provided for; and the gas-light company of each town required to furnish a laboratory and apparatus of all kinds necessary for the purpose of the inspectors; and especially that provision by which the minimum standard at which illuminating gas shall be merchantable is fixed at *sixteen* candles, to be *determined* by a *certain standard burner*, like the Parliamentary burner, so called.

This latter provision is really the main feature of the new bill and the one most insisted upon by its advocate; and it is here that there is the most doubt and the greatest difficulty in forming a conclusion.

It was claimed by Mr. Nash, of Boston, who addressed the Committee in support of the bill, that the present law is defective in fixing the standard of illuminating power so low as *twelve* candles. He urged that a richer gas ought to be supplied to consumers, and would be more economical for use, and that the lowest limit should be a gas equal in power to *sixteen* candles; that a gas of higher illuminating power and richer quality than that now supplied would be better for the health of the consumers, and that it was practicable and not oppressive upon the gas companies to fix the standard at sixteen candles.

He also urged that in testing the illuminating power of gas a standard burner, of the kind required by Act of Parliament in England, should be used, and that it is a radical defeat in the present law to allow the inspector to test the gas by the burner and under the pressure best adapted to it, and that it is practicable to describe and establish a kind of burner which ought to be used as a test of all kinds of illuminating gases.

To these claims the remonstrants replied, and offered evidence tending to show, that there are no American coals, with the exception of the Albert coal hereafter refered to, which will produce gas of sixteen candle power throughout the year; that American coals produce on an average a gas of not over fifteen candles power; that by using the Albert coal from Nova Scotia, mixing a small portion of it with the common coals, the companies are enabled to produce the quality they do; that as a fact, some of the companies furnish gas of a quality ranging from twelve to fourteen candles, others from fifteen to eighteen candles, and the agent of the Boston Gas-Light Company testified that the gas furnished by them during the last year was of about twenty candles power as tested by the inspector.

It was claimed that although sixteen candles is below the average of the actual illuminating power of the gas furnished by the Boston Gas-Light Company, yet to insure that the minimum should under all circumstances be sixteen candles through the State would require the use of cannel coal or of a very considerable proportion of cannel coal, or coal of that nature, which would involve a very great additional expense that would ultimately come upon the consumer; that this would bear with special severity upon the companies in the towns and small cities, where the price of gas is already high, and where, owing to the small number of consumers, the increased expense would add more largely to its cost, and consequently diminish its use, and the companies and consumers would thus both suffer; and in the large cities, too, it was claimed that the increased price would be burdensome to consmmers since, on account of the fluctuations in the range of illuminating power of all gas, these companies would be put to much greater expense to maintain a standard which should never fall below sixteen candles.

It was claimed that under the present standard a sufficiently good light was obtained, one more agreeable to most persons than a richer gas would furnish, and that a more expensive gas would not be agreeable to consumers.

The remonstrants urged that the burner described in the bill was not the fairest test for all kinds of gas, was impracticable, and that the English Parliament have recognized the principle of our present law by having gas tested by the burner best adapted to the kind of gas to be tested.

This whole subject of kinds of gas, their illuminating power, the merits of the different kinds, the proper standard of power for ordinary use, the practicability of a standard burner with which to test the quality, was investigated by a joint special committee of the city council of Boston in 1866, and evidence of experts and others taken, which evidence is fully reported in the report of the committee, in city documents of Boston, 1866, No. 116, entitled, "Report upon the Manufacture and Inspection of Gas."

We have examined the testimony presented before that committee, and whatever else may be doubtful, we are convinced of one truth, as expressed by Professor William B. Rogers, in the testimony as follows,

"It is not at all an easy class of questions that you have to deal with here The whole subject of gas composition and gas analysis, the determination of its illuminating power, and all these considerations, are complicated questions; they require a great deal of scientific knowledge, to understand them thoroughly."

The scientific experts who testified before that committee disagreed in many respects.

But Professor Rogers, who is the President of the Massachusetts Institute of Technology, was one witness, the authority of whose opinions on a scientific question of this kind we cannot overlook. He testified that "so far as the establishment of the inspection in the State of Massachusetts is concerned, it really was in advance in regard to knowledge of the science of gas-lighting, and a good deal in advance of the English Parliamentary law." That the Parliamentary burner (which we understand is the same described so minutely in the proposed bill,) was required by the English law to be used only in testing the common coal gas, and that the cannel gas was required to be tested by a batwing or fish-tail burner. That two qualities of gas are referred to in the Act of Parliament—common coal gas, and cannel coal gas. That the first is required to have an illuminating power of not less than twenty candles. That three gas companies in London—three of the largest in the world—furnished a gas averaging from thirteen to fourteen candles, sometimes running down to twelve candles, the Parliamentary limit of the common gas, and sometimes below twelve.

That in his opinion it was wise to leave to the discretion of the inspector how each particular gas should be inspected; that he believed a general law requiring the Parlimentary burner as the standard of all gas would discourage the introduction of and use of the higher and richer gases, if such gases were desirable, since it would not do justice in testing the richer gases. That he thought the proper minimum for ordinary purposes should be about twelve candles power;* that he considered the proposed standard of *sixteen* candles too high, unless the gas was to be made from cannel coal, or from coal containing a very considerable portion of cannel coal; that if there is to be a revolution in the manufacture of gas, and the manufacture of cannel coal gas only is to be required, the standard may be put higher, as high as twenty candles; but if cannel gas were to be required, then of course a very great additional expense would be involved, the kind of coal necessary not being easily accessible and being very costly and that it would be a large additional expense to the community. That he personally prefered the white light from the common coal gas to that from the cannel coal gas; that the yellowish or redish light of the latter, tending to smoke, was not agreeable to him.

The other material changes in the law that are proposed by the bill were objected to by the remonstrants in the hearing before your Committee. It was urged that to pay the salaries of so many inspectors, and furnish them all with the laboratories and expensive apparatus that would be necessary, would lead to a very large expense, which, like theincreased expense from the use of cannel coal, before refered to, would really come upon the consumers, and the most severely upon the consumers in towns and small cities. That it would be difficult if not impossible, to find men competent and of sufficient scientific knowledge to fill the offices, the matter of gas analysis being an intricate and delicate operation. That the objects sought by these changes were as well attained by the present system of one State inspector, with the right to appoint deputies, and that there was no evidence that the present system was not working well.

The agents of the gas companies of Lowell, Lawrence, Charleston, Brookline, New Bedford and Boston testified that they have but few complaints from consumers of the quality of their gas or of the correctness of the meters.

Considering the evidence presented to the Committee, and such knowledge and information upon the subject as we h ve been able to gather from reports of former investigations, we cannot say that the proposed bill is an acceptible substitute for the present law. The subject is one that requires much study and examination, and is one on which the experts themselves differ as to details. So far as weight of authority goes, we think it favors the present rather than the proposed law.

It is also to be remarked that no abuse under the existing law has been shown, and that no requests for a change has come before us from the consumers of gas.

So far we have had occasion to consider only two of the objects of which it is desirable to secure with respect to gas, viz: The accuracy of its measurement; and that it should have as high an illuminating power as is consistent with agreeableness of light and with convenience in its use. There are two other objects to be sought—cheapness of price, and, what is perhaps of more importance than all, purity of gas.

Neither the proposed bill nor the present law (beyond requiring the inspector to report upon the freedom of the gas from the certain impure elements,) secures the purity of the gas. No penalties are provided for furnishing impure gas nor is it declared unmerchantable. It is important that an article so extensively used, should be as healthful as possible; and in this respect the present law migh perhaps be improved, but the proposed bill does not suggest any improvement. It is also desirable that an article which in large cities has become one of the necessaries of life, should be furnished as cheap as possible. Under the proposed bill a certain standard is required, which, so far as we understand, would require the use of very expensive coals. The advocate of the bill does not propose that the gas companies shall be limited in their prices. The bill makes no provision as to price. A certain standard of gas *must* be maintained, regardless of cost to the company or of price to the consumer, and this required without evidence that the lower standard is unwholesome, disagreeable or inconvenient—whereas the great body of consumers may prefer a lower grade and a cheaper gas, if not unwholesome, to one of a higher grade and more costly.

It has been an important and interesting question, how shall gas be furnished cheaply? Shall the price be regulated by law? Shall cities and towns manufacture gas and supply it to the inhabitants on the same principle that water is supplied? And on this very question, our colleague, Mr. Nash of Boston, has hitherto done good service by inciting investigation and bringing to public notice many interesting and important facts. His disinterested zeal for the public good has led him to apply his abilities and enthusiasm for the last few years among other things, to an investigation of this whole subject of the supply of illuminating gas, and with much advantage to the public.

The present law which in his zeal he considers drawn in the interest of gas companies, is itself in a great measure due undoubtedly to his early efforts in this cause—and while we are unable to accept his proposed bill we would give him credit for all his labors and for his disinterested motives in prosecuting this matter. We would give him due credit for the present law, however poor an opinion he may have of it, which, without being perfect, nevertheless in our opinion furnishes a practicable way for securing accuracy of measurement, and also secure what is practically a gas of good illuminating power.

Although the present law may be susceptible of amendment, your Committee are unable to see any advantage to be gained by the enactment of the proposed Bill, and therefore report that it ought not to pass.

For the Committee,

A. A. Burrage.

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* Mr. Hyde. I understood you to say, that in burning the rich cannel gases, twelve candle power was the best degree of light?

Prof. Rogers. Yes, sir, for the common distributed light. I suppose every one is aware of the fact, that the pleasantness and agreeableness of an illumination depends greatly upon its diffusion. Nobody likes a very intense glare as the center of illumination in a room where he is sitting, and this standard seems to have been the result, unconsciously, of some general experience. The same thing is true, to a great extent, on the continent of Europe. All seems to have come, by a curious coincidence, to this mass of light, of about twelve candle power, as the proper degree of illumination for ordinary purposes.

Thereupon Mr. Nash dissenting, presented a long and rambling *Minority Report*, occupying 20 closely printed pages, to which we cannos possibly accord space. In fact, as its substance is chiefly adapted from the work of Dr. Bowditch, little of it would be new to our readers; and such arguments of weight as it contains have been met in the documents presented with the report of the Senate Committee, which we shall give in full. Some brief passing remarks, however, we shall throw out.

Mr. Nash lays stress (though none too much) upon the "mischievous influence of air in gas." The inference should be that a proper inspection must be such as to detect and lead to the prevention of the presence of air. Mr. Nash does not know, as the present writer does from much experience, that the mere detection

with certainty, much more the accurate determination, of small amounts of air in gas, is one of the most delicate and difficult operations of analytical chemistry, which few even of the most skilful analysts attain to. Mr. NASH says—"A qualified inspector would save to any city or town ten times his salary every year whether his salary was $1,000 or $3.000 per annum." Few "qualified" chemical inspectors would be attainable at wages ranging in the mean at about those of skilful mechanics: though of course there would be no difficulty in *filling* any number of such appointments.

So far as Mr. NASH's document can be made out, his intention, executed very vaguely, has been to adopt the general tenor of Dr. BOWDITCH's article upon burners, which is an attempt to establish the opinion he holds, in opposition to most other gas chemists, that a test-burner should be of the same kind as the burners *in general use*. This is as yet a mooted point in gas jurisprudence. What we wish to point out now is the inconsistency of the proposed new law with this principle, in selecting a test-burner not to be found in use in this country at all. The selection of standard test-burners, in any of our communities, will be a grave question, not to be satisfactorily determined without laborious investigatioh, and taking into the consideration a multitude of local conditions and circumstances varying in almost every case. For example, consider the great varieties of *materials* from which gas is made in our different cities and the consequent variations in density and composition: which will call for varying modes, in most cases, of developing the full benefit of the gas.

Mr. NASH says that "It has been at the instigation of gas manufacturers that flat-flame burners have been introduced for burning their common gas." This seems to us incorrect; argand burners require troublesome and fragile glass chimneys, and with the mass of consumers, *convenience* constitutes so important an inducement that they will in most cases prefer to use the commoner burner, in spite of the loss.

In quoting from Mr. RUTTER (page 19) Mr. NASH, referring to the principle that companies are right in using the test-burner best adapted to their own gas, has attributed (in parenthesis) the remark to RUTTER that 'no one but a company's advocate would admit anything of the kind. The draper has the same right to select the length of the yard by which he measures, and the grocer the weight of the pound by which he weighs." This piece of sophistry, wholly unworthy of its source, is in reality a *note* to the passage, as quoted in BOWDITCH, and RUTTER held no such views. We have the charity to deem this a mere inadvertence in the author of the Minority Report.

We have much more to say soon, editorially, on this general subject of burners.

The result of Mr. NASH's minority report was, nevertheless, that the House passed the proposed new Act by a large majority; but we rre informed that the explanation of this is to be found in a most reprehensible spirit of *jocularity* with which the whole subject was treated at the time, the bill being passed as a most exquisite joke upon the obnoxious gas companies!

In the Senate, the subject was referred to a special committee, composed of Messrs. SAMUEL D. CRANE and J. G. POLLARD; who rendered, after due investigatiou, the following report:

IN SENATE June 10, 1869.

The Special Committee of the Senate, to whom was refered the House Bill for the "Regulation of Gas Companies and the protection of Consumers of Gas," and the petition of Messrs. Converse, Taylor & Co. and others, in favor of the passage of the bill, having attended to the duty assigned them, beg leave to

REPORT:

The bill you refered to your Committee is substantially the same as one submitted to the Joint Committee on Mercantile Affairs, which, after a full and careful examination, received but a single vote,—that of the gentleman offering the bill. It differs from the orignal bill in only three points: the number of gas consumers which shall be needed in order to insure the appointment of inspectors; the manner in which the inspectors shall be paid; and the amount of impurity in the gas,—neither of which variations is material in view of the more important questions in the comparative value of the law now in force throughout the State, and the proposed bill, which is limited to only a part of the State.

Although all persons interested in the question were invited, by notice in the papers, to appear before the Committee on Mercantile Affairs, no one except the author of the bill appeared to question the efficiency of the present law, nor was any doubt thrown upon the knowledge, ability, fidility and scrupulous accuracy of the State Inspector. While it was conceded that the present law is susceptible of a mendment, it was clear to the Committee that although the law has now been in force nearly eight years, no inconvenience has yet arisen from any of its real or supposed defects, and that if any amendments may hereafter become desirable they will be rather of the nature of an extension of its paovisions than of a change of its principles.

The bill submitted to your committee proposes radical changes in the manner of testing gas and meters, and carries them out with a great variety of needless detail and expense. The whole principle of the bill, if there is any principle in it, is the burner, which was shown by abundant proof to be an untried experiment with the gases of the State, and not known theoretically or practically, as a just test for any one gas in the State.

The testimony of all experts, the experience shown by a most extensive legislation on the subject in Great Britain, all reliable evidence, pointed one way—that the value of the gas is in *itself*, and not in the burner, and that wherever legislation has specified a burner, it was one strictly adapted to the gas which was to be tried by it; that the most recent legislation in England had simply specified the grade of the gas and had left to the inspectors the selection of the burner by which it was to be tested; and that there was no human possibility of adapting one burner to ten, twenty or sixty gases, a large proportion of which, though of similar illuminating power, were made from coals and were of different chemical combinations.

This point of a fixed burner is of more practical importance than would appear at first sight. As an illustration of this it was shown in evidence that a burner in the possession of the Boston Gas-Light Company, like the one described in the bill, when used by the State Inspector for the purpose of testing Boston gas, reduced its value, which was from 18 to 20 candles, below the standard of the proposed bill, and would make that company absolutely liable to a fine of $100 for each day that they continued to make a gas which, as gas is commonly burned throughout the United States, is of the grade known as 18 to 20 candle gas, but which is at once reduced below 16 candles when burned in the proposed burner, simply because that burner is not suited to the consumption of five cubic feet of gas of a high quality. In other words, in order to comply with the provisions of the proposed bill they must reduce the quality of their gas to such an extent that it can be used in a burner which is not a fair test for the gas now made by them, and which is not in use by any one of their consumers. The effect of this reduction in the quality of the gas would be an increase in the amount of the bills which their consumers would be called on to pay; and to provide by law that 5 cubic feet of gas consumed in this burner should be equal to 16 candles would forever prevent the use of gases of a higher illuminating power, bncause 5 feet of such gases cannot be burned in this burner without smoking.

Since the hearings before the Committee on Mercantile Affairs, the report of the State Inspector has been printed, giving much additional information as to the working of the present law. From this it appears that there was in only three of the cities and towns of the State sufficient curiosity or complaint as to the quality of the gas supplied to them to lead to a special application for the services of the inspector. It also appears from other inspections made for his own information, with such test burners as he pleased, without the intervention of any officer of any gas company, that he had tested "nearly all the illuminating gases offered for sale by the companies in the State, and in every case found them above the legal standard," and that he had inspected most of the meters in use.

Your committee are aware that denunciation of the extortions of gas companies is a very simple and popular way to gain public notoriety. Recent investigations in New York disclosed, on the part of one corporation, enormous profits obtained by selling gas of a low value at a high price. But in justice to the Massachusetts companies, it should be stated that no similar evidence respecting their manufacture or their profits was offered to the committee. In regard to the petitioners who have asked the passage of the proposed law—for the reason it is better adapted for their protection than the law of 1861—it must be they did not give the subject that careful consideration which all petitions should receive before signatures are placed upon them. After the signature of N. B. Mansfield, follows, "*provided they do not sell out*," showing evidently he did not know what he was sigding. One gentleman informed your committee he "signed the petition to get rid of Mr. Nash, who presented it."

It is sufficient to say that no one can carefully compare the present law, which applies to every gas consumer and every gas company in the State, with the proposed substitute, which leaves the whole subject of gas and meter inspection in one half of the State dependent upon the action or non-action of the city or town authorities, ond not see that the gas consumers are better protected now than they would be under the proposed bill, and that the justice which is done to the gas companies in the law of 1861 is denied to them in this substitute. Your committee, desirous of obtaining all the information possible on the subject of the proposed law, forwarded copies of the same, with copies of the law as it now stands on the statute book, to the following gentlemen, acknowledged as experts in gas science in this country:—Professor HENRY WURTZ, New York; Professor BENJAMIN SILLIMAN, New Haven; Professor F. H. STORER, Boston; M. L CALLENDER, Esq., New York, editor of "GAS-LIGHT JOURNAL."

Copy of Letter—addressed as above noted.

BOSTON, May 21, 1869.

Dear Sir: We forward to your address by to-day's mail copies of the law now in force in this State for the inspection of gas, gas meters, etc., and of a substitute for it which has recently passed the House of Representatives, and has been referred in the Senate to a special committee consisting of the nndersigned So far as we can ascertain, the opinion of experts here is against the proposed substitute for the present law; but as the matter is one which so largely affects both gas consumers and gas companies, we are desirous of obtaining the fullest information possible. Will you have the kindness, therefore, at your earliest convenience, to give us the benefit of your judgment on the following points?

1. Are you familiar with the testing of illuminating gas and the legislation connected with the subject?

2 Have you ever seen the burner described in the 6th section of the proposed law, and which is called, we believe, the Birmingham burner?

3. If you have seen it, have you ever tested any gas with it?

4. Do you know whether it is, or is not, a fair test for a 16 candle gas?

5. Supposing this burner to be adopted to a test burner, would not the companies which make 18 to 20 candle gas be obliged to reduce the grade of their gas, so that it could be tested by the burner, and thereby increase the amount of gas consumed by each customer?

6. Do you know of any one burner by which gases of different chemical combinations, but having an illuminating power of 16 candles, can be properly tested?

7. Is it so easy and simple a matter to test the quality and purity of gases, that cities and towns could, ordinarily, obtain inspectors with the reqnisite scientific knowledge?

8. Would the passage of the proposed law secure a uniform inspection of gas throughout the State?

9. In case of a dispute between a gas company and an inspector ought there not to be some appeal from his decision?

10. In general, do you think that the interests of all parties concerned would be better protected under the substitute than they are under the present law?

We remain, your friends truly,

SAMUEL D. CRANE,
J. G. POLLARD,
Massachusetts Senate Committee.

The answers to the above will be found in the Appendix to this report, as will also be found the report [E] of a hearing before a committee of the House of Lords on the Hanley gas bill; extract from a paper by Dr. Letheby [F] on the chemistry of gas lighting, 31st May, 1865; and extract from the report to the court of common council [G] of the special gas committee on the passage of the city of London gas bill, 1868. Also [H] extract from the appendix to report from the select committee on metropolis gas bill, 1867; correspondence [I] of your committee with the Massachusetts State Inspector in relation to the burner offered by Mr. Nash before the committee, and the test made in Mr. Nash's presence of the power of that burner to burn a high grade of gas.

From the foregoing the Senate will receive the information that no one kind of a burner is suitable to test the different kinds of gas made by the different gas companies in this commonwealth. The "Birmingham" burner was made for the gas of the city of Birmingham, which was 14 candle gas, and it is impossible to burn five feet per hour of a 20 candle gas without smoking. Mr. Stimpson informs us he could pass but 4.25 cubic feet per hour through it without smoking, and when he passed five cubic feet he had a long smoky flame eight inches above the chimney. Your committee are fully satisfied that the bill is crude, inconsistent and unjust; that its principles are at variance with the results of all recent scientific investigations of this obscure subject, and that it ought not to pass.

SAMUEL D. CRANE,
J. G. POLLARD,
Special Committee of the Senate.

APPENDIX.

[A.]

REPLY OF PROFESSOR WURTZ.

No 26 PINE STREET, NEW YORK, June 4, 1869.

To the Honorable Commttee of the Massachusetts State Senate.

Gentlemen:—I have the honor to submit replies to the questions you have laid before me.

Your *first question* is: "Are you familiar with the testing of illuminating gas, and the legislation on the subject?" In the former I claim to be an expert. I assisted in drafting the bill recently proposed to the New York Legisture for regulating illuminating gas.

Your *second question* is substantially: "Have you seen the so-called Birmingham burner.

It has not, so far as I know, been used as a test burner in this country. It is wholly unadapted, however, to burn, without smoke, gas of more than 13 or 14 candle power, chiefly in consequence of its small internal diameter, (but half an inch at the top.) Our largest gas company, the Manhattan, whose standard ranges about 15 candles, use a test burner which has a diameter of throat of 0.66 inch. Considerable confusion is introduced into the printed documents sent me by you, by designating this burner constantly as the "parliamentary burner," whereas no general Act of Parliment specifies this burner.

Third question. I have not tested gas with it.

Fourth question. It cannot be a fair test for such gas for the plain reason that it cannot supply air enough to burn properly a gas of this grade.

Fifth question. According to to the general testimony of gas engineers, it is impracticable to measure even 15 or 16 candle gas with a burner of these dimensions, much less 18 or 20. Unless I strangely misapprehend or misinterpret, the whole proposed law, with section 5, would, without doubt, be impracticable and inoperative.

Sixth question. The meaning of the question is not clear to me. If it is meant to ask whether the burner exists which would indicate whether a special gas would give sixteen candle power, or more or less, with another burner, the answer is No. The enormous difference in the indicating of different burners has long been a matter of notoriety among those familiar with gas. For example: The London Board of Gas Referees have recently adopted for low grade gas a new Argand test burner, which gives in the proportion of 116 candle power, while a common fish tail burner gives but 89; but, with cannel gas, they state that this proportion is more than reversed; for while the new Argand gives with this 100, the common fish tail gives 118. It appears that the Act of Parliament vaguely directs a 15 hole 5 foot Argrand, with 7-inch chimney, admitting the widest variation in internal diameter. Hence much trouble and confusion regarding the test burner. It has been claimed that a test burner should be used similar to the burner *most generally in use by the community.* If so, the first step should be to ascertain what form of burner is in most common use. Certainly not the Birmingham. Others claim that the companies are entitled to use as a test such burner as suits their own gas best, and that consumers should conform. These are noted points, still requiring much examination. If means were discovered of making high grade (say 18 candles) gas very cheaply, the common, cheap fish tail, requiring no chimney, would become the best burner for the consumer. It has occurred, also, that the sixth question may have been intended to relate the comparison of different gases with the same burner at equal consumption of five feet per hour. If so, the reply must still be most positively in the negative, as is apparant from the facts already presented.

Seventh question. It is not. Suitable persons, under the proposed law, could rarely, and, with no certainty, be obtained. Section 3 makes them gas chemists and analysts. No test of capacity or qualification is mentioned. In the minority report, salaries of $1,000 to $3,000 are mentioned. None such could be obtained, at the latter sum; few for any sum. One familiar with the delicacies and difficulties of gas analysis, and the fact that many chemists, skilful in other analysis, never acquire this, will look upon the scheme as one of the bare possibilities of the future, but of a future still far ahead.

Eighth question. The reply is included virtually in that to the last question. Without uniformity of inspectors, how could there be any of the inspection.

Ninth question. Competent inspectors, on the basis proposed, should assign such exact and conclusive reasons for their dicisions, based upon experimental teste, that no appeal could reasonably hold.

I believe that no system of inspection could be expected to become successful and permanent unless placed under control of men whose high position in the world of science would furnish an assurance of rectitude, efficiency and incorruptibility; provided, also, with salaries of the most liberal amount. Inspectors may then be but assistants.

Tenth puestion. I do not. Time and space limi me to but a few points.

Section 3 of the proposed law creates *many* instead of one central laboratory, provided with standard test apparatus, which latter provision I believe to be essential. Who is to specify the nature of the test instruments, etc., with which these many distinct laboratories are vaguely directed to be provided? Shall each inspector select his own?

There are no efficient or even specific regulations in the proposed law regarding the highly important points of *density, pressure, purity, permanency,* etc. The mass of consumers are more interested in knowing that the, article is *uniform* and *reliable* in quality and purity, than even in getting an article of a little higher grade, just as they prefer to burn a coal which is pure and uniform to one of higher heating power, but full of sulphur and clinkers. The proposed law would give them little assurance as to purity and uniformity, whilst the higher cost of more candle power would fall upon them,—more especially in small towns with few consumers-where (owing to the small scale,) the cost of manufacturing is already large.

The enforcement, uniformly, of a 16-candle gas, cannot but be of vital consequence to many of your producers, particularly those in inland towns and localities not upon tide-water. Considering the distance of Massachusetts from the coal-producing centers, and the severity of the climate in winter, which tends so powerfully to depreciate the gas, I cannot but look upon the adoption of such a regulation throughout the State of Massachusetts as hasty, indeed highly unjust, legislation.

In conclusion, after an exhaustive review of all questions involved I must state my conviction that the proposed law is full of impracticabilities, and that its adoption would be a misfortune both to consumers and producers, and a retrograde step into the dark ages of gas legislation.

I am, gentlemen, with high respect,

HENRY WURTZ,
General and Analyical Chemical Expert.

BOSTON June 9, 1869.

Since the above was written, I have had an opportunity to test an authentic Birmingham burner, made by SUGG, of London, and obtained from him by MR. GREENOUGH, of the Boston Gas-Light Company. Its principal measurements I found as follows:—

Diameter across the top,	. . .	1.1 inch.
" of throat,	. . . .	0.5 "
" of apertures,	. . . .	0.05 "

The Boston city gas, of about 20-candle power from a suitable burner, at this time, when passed at the rate of five feet per hour through this burner, made a long smoky-flame streaming eight or ten inches above the top of the 7-inch chimney. When reduced to four feet flow, the candle power, by the photometer, corrected to five feet, was just 17 candles, a result virtually identical with that of Professor Silliman with the same burner. Other observations were made closely corresponding with the opinions of this proposed test burner, set forth by me before, and which were so closely accordant with those already reported independently by Professor Silliman, that I shall not occupy space with them here. Respectfully,

HENRY WURTZ.

[B.]

REPLY OF PROFESSOR SILLIMAN

BOSTON, June 7, 1869.

Hon. SAMUEL D. CRANE and Hon. J. G. POLLARD, *Massachusetts Senate Committee.*

DEAR SIR:—In answer to your favor of the 31st of May, I have the honor, after mature reflection, to answer as follows: To the first, second, and third questions my answer is in the affirmative. To the fourth, fifth, sixth, seventh, and eighth questions, my answer is in the negative; and with your permision I will now proceed, as briefly as possible, to state my reason for the opinion. The so-called Birmingham burner is a particular form of Argand burner, adopted upon the recomendation of Dr. Letheby as best adapted to develop the illuminating power of the gas in the city of Birmingham, England. The gas, possessed by the evidence before us an iluminating power of fourteen candles, as required by the Act of Parliment. But this burner is not adapted to a gas of different grade, and has never been adopted by the gas referees for the city of London. I have applied this burner as a means of testing the gas in Boston, Roxbury and Dorchester, in company with the State Inspector for Massachusetts to whose courtesy I was indebted for the opportunity, of using an authentic copy of this Birmingham burner,

At Roxbury, I found the gas to possess a mean candle power of 16.10, when tested by this burner. This gas appeared to me, and my judgement was confined by that of the inspector, to a much better than a sixteen candle gas, being in our judgement equal at least to eighteen candles. The consumption during our examination was as nearly as possible five feet, (4.97) at which point the flame tailed up badly—at least three inches above the chimney. The burner was certainly very ill-adapted to develop the illuminating power of this gas.

At Dorchester, the same burner developed a power of 14.68 cannles; and when placed in contrast with a more common form of parliamentary burner, the Birmingham burner is seen to be inferior, inasmuch as by the second the power of the gas was recorded to 14.94.

In Boston, at the photometric rooms of the State Inspector, I had the opportunity to bring the Birmingham burner into comparison with an ordinary form of Parliamentary Argand, and with the ordinary form of fish-tail in use in this city. We found it impossible to consume much more than four cubic feet of the Boston gas in the Birmingham burner, and even with this diminished consumption the flame "tails" badly above the top of the chimney. The corrected observation by this burner gave on the seventh of June, 16.61 on a consumption of 4.14 cubic feet, corrected up to five feet, by the ordinary rule.

By the same parliamentary burner which gave for the Dorchester gas an illuminating power of 14.94 candles we obtained from the Boston gas nineteen candles; and by the ordinary fish-tail burner commonly in use in this city, and marked for six feet, although reduced by our experiments to less than five cubic feet, (say 4.69,) the Boston gas had when corrected by the ordinary rule an illuminating power of twenty-one candles. Tested by the Birmingham burner at the same time and place the Boston gas was found to possess an illuminating power of only 16.60 candles. It must be conspicuous to any person from the simple inspection of these results that the Birmingham burner is very ill-adapted to general use, and that it is restricted in a point of fact to a gas not exceeding an illuminating power of fourteen candles—that when employed to test a gas such as that which is furnished by the Boston city gas-light company it is found lamentably deficient, and would result practically, were it adopted as the legal standard in compelling this company to reduce the standard of their gas to 79 per cent, of its present power, being a clear loss of 21 per cent, to the consumer. This loss, be it remembered, would not be felt so much in the diminished illumination obtained as in the increased amount of the bills which must be paid for a larger consumption of an inferior article so as to obtain the same amount of illumination. In other words, the consumer would have to pay for the same amount of light at least 26 per cent. more than they now do.

The results above quoted furnish a convincing proof of the accuracy of Dr. Letheby's statement that the Birmingham burner, so-called, is the best adapted for 14-candle gas, and equally convincing that this burner is very poorly adapted to develop the power of richer gases than that for which it was designed.

As the law requires five cubic feet to be consumed per hour in this burner, it is impossible to adapt it to gases of different chemical combination, many of which owing to the peculiarity of their constitution, demand a larger volume of air than others for the most complete dovelopment of the light which they are capable of producing. No one will dispute the proposition that every consumer of gas is entitled the highest benefit that the article for which he pays is capable of affording, and fortunately at this point the interest of the manufacturer and the consumer meet.

The results obtained from burning the Boston gas in the ordinary fish-tail burner, consuming in our examination only 4 7-10 cubic feet per hour gave an illuminating power of 201-3 candles, which was nearly 7 1-10 candles more than was obtained from burning the maximum quantity of the same gas which the Birmingham burner is capable of consuming. Here plainly is a loss to consumers by this comparison of more than 35 per cent.

The skill which is necessary to qualify a person to be a competent inspector of gas is not easily obtained, and the number of persons thus qualified in this country is, according to my observation, by no means large.

In the case of a dispute between a gas compony and an inspector there ought to be some tribunal to which an appeal can be made, as it is certainly possible that an incompetent person may be appointed to this office.

In answer to the tenth question I would very respectfully suggest that in my humble judgment, the proposed law is a very inadequate provision for the purposes which it contemplates, and an imperfect exhibition of the present state of knowledge on the important subject of the manufacture and distribution of gas, and that its passage would not be creditable to the intelligence of the enlightened commonwealth, whose interest it is intended to protect.

B. SILLIMAN,
Prof. of General and Applied Chemistry Yale College.

[C.]

REPLY OF PROFESSOR STORER.

32 TREMONT STRETT, BOSTON, June 2, 1868.

Messrs. S. D. CRANE and J. G. POLLARD, Massachusetts Senate Committee.

Dear Sirs: Your letter of May 31st, propounding questions relating to the testing of illuminating gas, came to hand yesterday, together with copies of the

State law "For the Inspection of Meters, etc," and the proposed substitute for that law.

I gather from your letter that you desire categorical answers to the questions. I would reply therefore:

1st. That I am tolerably familiar with gas testing, and that I have paid a certain amount of attention to the laws of England, France and America, which relate to that subject.

2d, 3d and 4th. I have seen a specimen of the so-called Birmingham burner, but have never tested any gas with it (so far as I now remember). Speaking in general terms, I may say that I do not esteem it a proper burner for testing 16-candle gas. From the peculiar construction of the burner it would be, *a priori*, unfit for testing high grade gas, such as is made in Scotland and in several American cities.

5th. I think they would. In other words, I do not believe that gases of 18 or 20 candle power can be fairly tested with the Birmingham burner.

6th. No. For each and every kind of gas there is, of course, some one form of burner better fitted than any other form for testing that particular gas. In order that any kind of gas may be burned advantageously it is necessary to adjust the flow of gas and of air so that there shall be just enough, and no more than enough of the latter to completely consume the former. The amount of air needed depends not only on the quantity of the gas which flows out to be burned, but to a still greater extent it depends upon the quality of the gas. But different kinds of 16-candle gas differ widely as to their quality—as to their chemical composition I mean. Hence, whenever a new kind of gas is manufactured new experiments have to be made in order to find the burner best suited for that gas.

A burner having a certain range of adaptability for burning different kinds of gas, might probably be made from a broad Argand burner, provided with large air spaces and many holes for the exit of the gas (such as would be proper for burning rich gases) by fitting to its air-ducts a sliding arrangement by which the supply of air might be diminished or increased at will. Such a burner, however, could only give a certain approximation to the best results. It would, in most instances, be only a rough substitute for the best burner.

7th. Outside the large cities, I do not think it would be easy to find many persons properly fitted to be inspectors of gas.

8th. I do not believe that a uniform inspection of gas could be secured throughout the State by the passage of the proposed law.

9th. The right of appeal from the decision of a gas inspector should surely be allowed the gas companies. Gas inspectors, no matter how expert, would still be human beings, with human liability to error.

10th. The proposed law seems to me to be inferior to the existing law. I should state, however, that I fail to see the meaning or significance of some portions of the proposed law. Such, for example, as the section relating to burners (§ 5).

With much respect, I remain,
Your obedient servant,
FRANK H. STORER.

[D.]

REPLY OF M. L. CALLENDER.

NEW YORK, June 5, 1869.

Hon. SAMUEL D. CRANE and Hon. J. G. POLLARD, Senate Committee.

Dear Sirs: Owing to my absence from the city your communication of May 31st has remained unanswered. Presuming that you require an early answer, I shall therefore do so now, and necessarily very briefly, and without taking the time to fortify myself with references to authorities I would do were more time at my command.

You will find the answers to your questions *seriatim*.

First question.—Answer. I am.

Second question.—Answer. I have.

Third question.—Answer. I have.

Fourth question.—Answer. It is not a fair test for 16 candle gas. The Birmingham burner was gotten up for the special purpose of testing gas at Birmingham, England, because it gave the *best results* with the gas of that locality. This gas was *less* than 16 candles, generally about 12 to 14 candle power.

Fifth question.—Answer. If this burner were adopted as a test burner for all gases, companies making 16 to 20 candle gas, in order to have a fair test, would require to reduce the grade of their gas, and consequently increase the amount of gas consumed by each consumer. It would be very unjust, and a great hardship to compel gas companies making a high grade of gas—of, say, 16 or 20 candle power—to test it with the Birmingham burner. In fact, the *true* candle power of the gas could not be obtained with said burner.

Sixth question.—Answer. Gases of *different* chemical combinations, but having an illuminating power of 16 candles, cannot be properly tested by any one burner. The burner that will give a correct result with the different conditions above mentioned has not yet been invented.

Seventh question.—Answer. There are but few men in the United States fully qualified to test the quality and purity of illuminating gases. Hence it would be impossible to find inspectors having the requisite chemical and scientific knowledge in many of the towns now lighted with gas.

Eighth question.—Answer. The passage of the proposed law now before the State Senate of Massachusetts would not secure a uniform inspection of gas throughout the State, for the reasons stated in the last answer.

Ninth question.—Answer. There should be an umpire or some tribunal of appeal from the decision of an inspector. If the inspector's decision is final, grave abuse of so great a power would be likely to occur.

Tenth question.—Answer. I have examined the present law and the proposed substitute in a critical and impartial manner, and are unable to see where the interests of all parties concerned would be better protected by the substitute. On the contrary, should it become a law, we can see where much injury may occur to innocent parties—even those it is intended to benefit. It will, without reasonable notice, place a great and unreasonable expense and burden upon the gas companies, without any real gain to the consumers of gas, but rather a loss, inasmuch as they now obtain a given amount of light with more economy, from the quality of gas generally furnished them, than they could from a higher grade of gas. The question of economy for heating purposes is on the side of low candle gas.

Some of the advantages of low candle gas compared to high grade gas are, the freedom from glare, so hurtful to sight, and the health of nervous people; the diffusion of light, without the necessity of interposing globes, shades and other media which act only by annulling or reducing the candle power, as much in some cases as 50 per cent., seldom less than 10 or 20 per cent.: the freedom from smoke and soot, and injury to furniture, etc.; the permanence or stability of the candle power in cold weather, etc.

The change in candle power proposed would burden the people with the expense of an *entire change of burners*, or it would cause great inconvenience, and much damage would occur to walls, hangings and furniture from the soot of free carbon thrown down.

Most respectfully, etc.,
M. L. CALLENDER.

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Geologist and General Scientist,
PROFESSOR HENRY WURTZ.

[NOTE BY PROFESSOR WURTZ.—Contributions and items for which I am, as a Scientist, individually responsible, will have attached my full name or initials.—H. W.]

FRIDAY, JULY 2, 1869.

WISHING TO MAKE this Journal an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers olicit letters from all among them who make the study of those subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS* or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

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To Clear a Room of Mosquitoes.—A writer in a South Carolina paper says: "I have tried the following, and find it to work like a charm. Take of gum camphor a piece about one third the size of an egg, and evaporate it by placing it in a tin vessel, and holding it over a lamp or candle, taking care that it does not ignite. The smoke will soon fill the room, and expel the mosquitoes. One night I was terribly annoyed by them, when I thought of and tried the above, after which I never saw nor heard them that night, and the next morning there was not one to be found in the room, though the window had been left open all that night."

A NEW VOLUME.

With the present number a new volume of this Journal commences. Ten years ago the AMERICAN GAS-LIGHT JOURNAL was commenced under the belief that such a publication was desirable, and would be beneficial to the gas fraternity. Since then ten volumes of it have been issued, and this number is the first of the eleventh volume. The notices, descriptions and illustrations of new inventions and discoveries in this country and in Europe, besides the usual variety of intelligence in science and art which have been presented through its columns have, we trust, not only been instructive, but have served to stimulate the inventive genius of our country.

We are constantly improving the Journal, without regard to labor or expense, intending thereby to keep it quite up to the progressive spirit of the age, and in advance of any other publication of the kind in the world.

The department under the head of "Chemical Repertory," with the valuable aid of Prof. Henry Wurtz, and of others, will open to our readers a new field of important and interesting information which, we trust, will be appreciated in the future as it has been in the past, if we may judge by the many flattering encomiums it has elicited.

The new heading, which our readers will observe with this number, marks the commencement of the new volume. It is intended to make the appearance of the Journal more distinctive, and at the same time characterize the specialities upon which it most treats. If it gives better satisfaction to our patrons than the plain title of old, our gratification will be complete.

The extent of the gas interests of this country and their rapid growth are not realized generally, perhaps. At present there are over 60,000 persons directly engaged in the manufacture of gas and its distribution, while the various branches of industry arising from and connected with its manufacture and distribution, give employment to at least 250,000 people. There are 25,000 cities and towns capable of supporting gas works in the United States. The increase of gas supply in the United States is nearly 10 per cent. per annum.

These estimates give some idea of the value and importance of this Journal, which includes in its list of subscribers almost every gas company in the United States. It has also an extended foreign circulation. The large chemical, scientific and mechanical interests in this country and abroad, also find our Journal a valuable auxiliary, and worthy of liberal patronage, which is constantly increasing.

The Patent Department of our Journal is also proving of much importance, inasmuch as we make difficult and abandoned cases a speciality, and have proved our ability to do all we claim, and more,

In conclusion, we shall endeavor to make our next volume by far the best yet issued, and shall not fail to keep the standard of the Journal up to, and superior to any former period of its history.

GAS LEGISLATION.

We present, in this issue, substantially the whole story of the late attempt in the Massachusetts Legislature, to introduce new principles of regulation of the manufacture of gas. The almost exact agreement in every point, between the written replies of the several Experts to the questions propounded, cannot fail to arrest attention, though it will create no surprise on the part of those familiar with the subjects involved. These replies were written of course in entire independence of each other, and without previous consultation. It may be necessary here to suggest that it must by no means be inferred that these gentlemen or any of them, are opposed to legislation on the subject of gas altogether. The contrary is doubtless the case, and we are sure that they all believe that well-considered and carefully-elaborated reforms in the regulation by law of gas-production and distribution, would tend greatly to the final behoof of both consumer and producer; if only by the prevention of the petty feuds now constantly arising, and the establishment of a better understanding. Far more than this could (and will) nevertheless be accomplished, in time, by regulations based upon correct established principles, and drawn up under the heedful advice of such as have maturely mastered the multitude of complex condition entering into the problem.

A perfected Gas Act should, in our opinion, not only fix fair and just standards, but provide for instruction of the people, from authoritative sources, such as would command their attention and respect, as to the chemical composition, quality, purity, pressure, permanency and candle power of the gas furnished at each place and at all times; and, moreover, what is not less important, as to the means and apparatus adapted for developing the best light from the gas in each case. When the draft of the bill proposed to the New York Legislature at its past session (already published by us in our issue of May 17th) was made, such views of the case led to the suggestion (on the part of the present writer), which was adopted by the House Committee, that the inspection (in the Metropolitan District of New York and Brooklyn) should be under the sole control of a Board of three Scientific Chemists, eminent (and selected) for their especial familiarity with Gas and Gas-Analysis; which Board was to have the whole supervision and responsibility, and its decision be final. Subordinate Inspectors would, under this organization, be virtually assistants, and such a Board would constitute a Board of Appeal in all controverted cases. We shall soon place before our readers some critical comments upon the proposed New York law. H. W.

THE OXYHYDROGEN LIGHT—IS IT A SUCCESS?

Numerous inquiries have lately been made of us, both orally and by correspondence regarding the merits of the New Light, as it is called, which term by the way, is a *misnomer*, because the oxyhydrogen light is old—almost of age; it having been employed by Lieut. Drummond of the English navy for signalizing, about 20 years ago.

The exhibition of the light which has been made in this city for many months, under the auspices of some French gentlemen, has been done we understand with a view to induce capitalists to subscribe for stock in a company which proposes to develop a cheap process of making oxygen. A very elaborate and complicated miniature model of the French apparatus has been on exhibition at the company's office—not a working model, be it understood. The oxygen used for exhibition of the light, whenever we have seen it at the company's office and at Ball, Black & Co., and elsewhere, we learned was made be the same old *chlorate of potash* process, supplied by the parties who have always supplied it to light our mass meetings, theatres, skating rinks, etc., and at the *moderate* cost of about $140 per thousand cubic feet, instead of $25 or any smaller sum. By means of these exhibitions capitalists have been induced to subscribe, money to erect works, we understand, which are now in process of construction on a large scale to *test* the French process. When the works are completed it is expected oxygen gas will be produced at a much less cost than heretofore.

That it may be produced at a less cost than by the usual process, is quite probable.

"And if it can be produced at low cost, what then?"

"Will it interfere with coal gas?"

"What effect will it have upon the present methods of artificial light in general use?"

These are some of the questions that have been propounded. To the first question we answer. It will be a good thing for those who get up our scenic displays, and with proper reflectors and apparatus it will be, as heretofore, excellent for political mass meetings, for grand theatrical illuminations, *a la Barbe Bleu*, Black Crook, etc. We understand it is the intention of the new company to force the oxygen under high pressure into portable iron or copper cylinders, and supply it, on the soda water principle, to all who have a taste for spectacular displays, and the means to gratify their taste, as for example the illumination of picture galleries, gardens, and pleasure grounds, etc. It will also, doubtless, be really useful for light-houses and marine illumihation, and the like.

It may be valuable for chemical, metallurgical, and other purposes, if hydrogen sufficiently cheap, is used in connection with it; and in this way we have reason to believe it may be brought into extended use, and materially to the advantage of the various arts and industries requiring great heat and a pure combustible.

When it comes to the question of utilizing it for general and domestic purposes however, it is quite a different matter. Such a scheme will be found to be entirely utopian, and most positively and obstinately impracticable. The principal reasons why, are doubtless apparent to most of our readers.

We have neither room nor time now to treat the subject in detail, but purpose to do so fully in our next issue. In the mean time we beg to refer those of our readers who are interested in this subject to an article we published in this Journal, June 2d, 1868, No. 23, vol. 9, wherein we treated the subject at length. Our views there expressed have not, after the lapse of a year, become any more favorable in regard to the feasibility of utilizing oxygen to produce a practical light for domestic or general use.

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BALTIMORE, April 29th, 1869.

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Manufacturers of Premium Fire-Proof Bricks, &c.,
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Gentlemen: The "Gas Light Company of Baltimore," since the establishment of their works in 1816, to the present time, have used your "Premium Fire-Proof Bricks, Tiles, &c." almost exclusively, which is our guarantee of the very high estimate we place upon them.

Yours truly,
J. MOWTON SAUNDERS,
Engineer Gas-Light Company of Baltimore,

BALTIMORE, March 23d, 1869.

Messrs. JOHN S. & GEORGE R. BERRY,

Gentlemen: I have had the management of various furnaces for many years, where I have had occasion to use fire brick made by different manufacturers, and am compelled to say, that BERRY'S PREMIUM FIRE BRICK, made by you, are superior to all others I have used.

Respectfully, yours,
WM. J. COCHRAN,
MANAGER AT MT. CLARK DEPOT,
Baltimore & Ohio Railroad Co.

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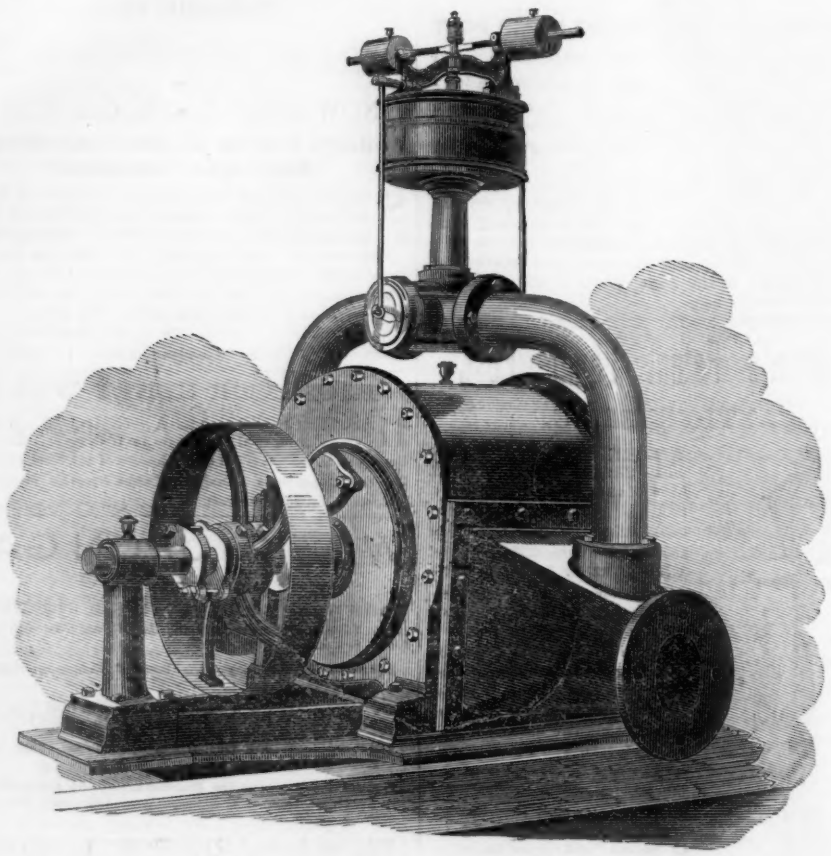

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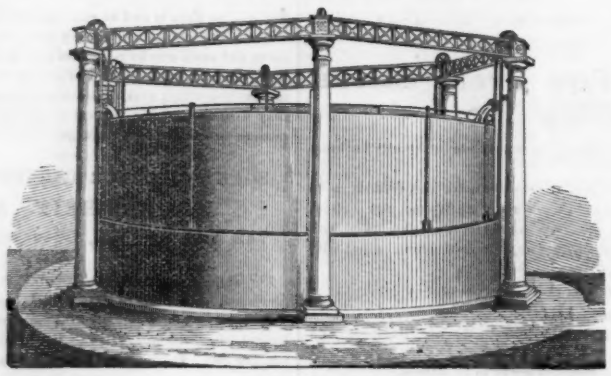

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FIG. 1.

Fig. 1 shows a single gate valve.

Fig. 2 represents wedge and one-half of gate.

Fig. 3, a section through body, gate and wedge, intended for larger sizes of water valves required to bear heavy pressure either side.

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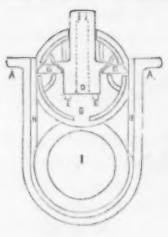

FIG. 3.

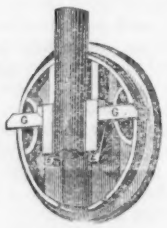

FIG. 2.

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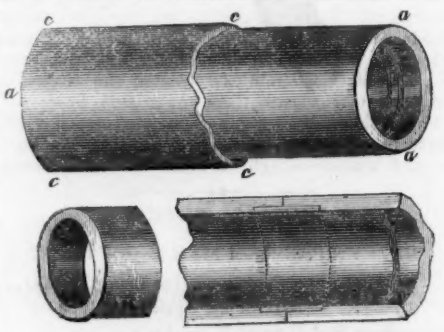

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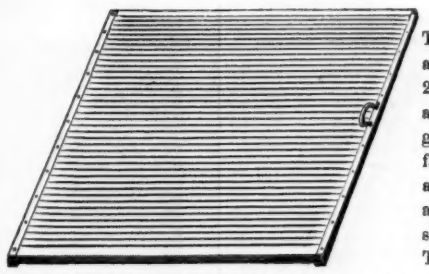

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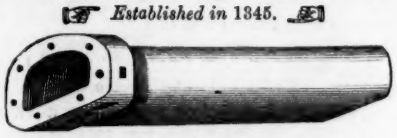

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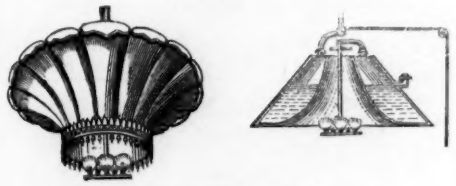

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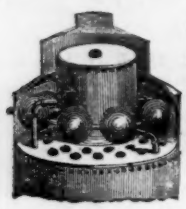

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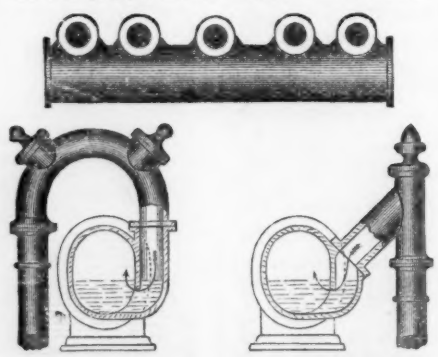

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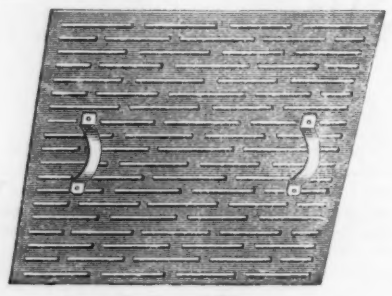

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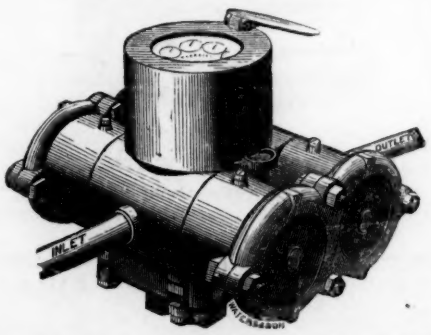

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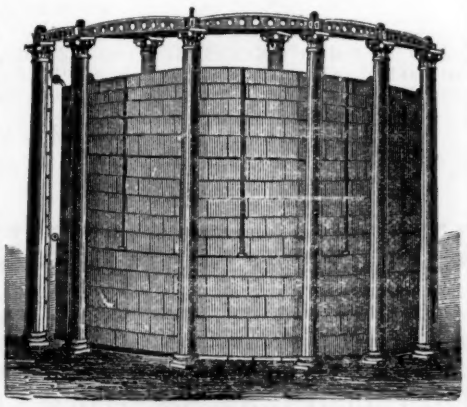

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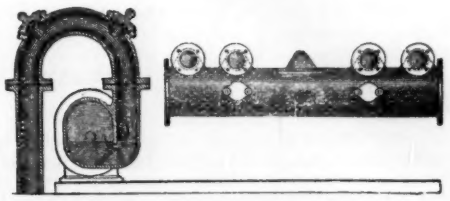

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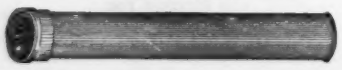

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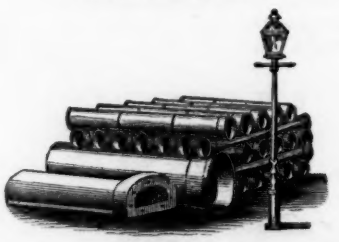

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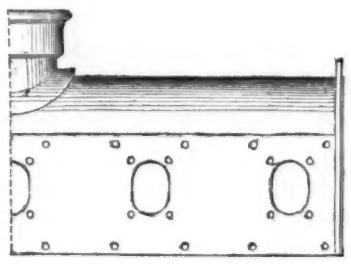

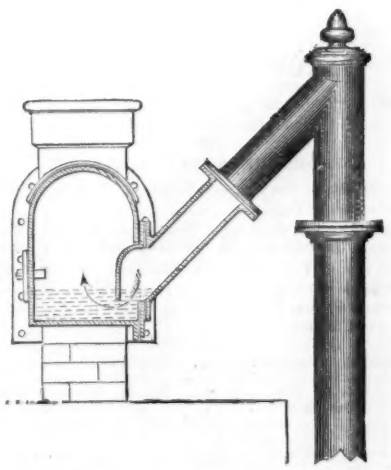

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AUG 13 1869.